

M U S H R O O M C U L T I V A T I O N O N L O G S U S I N G S A W D U S T S P A W N



NORTH SPORE



SPECIES

SHIITAKE *Difficulty: Beginner*

Shiitake mushrooms can be grown using any of the log methods. They are a nutritious and medicinal mushroom that produces brown umbrella-shaped caps. Our particular strain is wide range and therefore will fruit in a larger range of temperatures.

OYSTER *Difficulty: Beginner*

Blue oysters can be grown on logs, in beds or in containers. They are the most common native strain of oyster mushrooms worldwide, often with single brown caps in the wild. This cultivated species can vary in color from grey to a steely blue. They tend to prefer cool weather and may fruit naturally as temperatures drop.

ITALIAN OYSTER *Difficulty: Beginner*

Italian oysters can be grown on logs, in beds or in containers. One of few species that may grow well on pine family trees, though yields can be lower or more inconsistent than hardwood substrates. Italian oysters have large pale brown caps. They grow well in a wide temperature range, often fruiting in mild summers and into the shoulder seasons.

SNOW OYSTER *Difficulty: Beginner*

Snow oysters can be grown on logs, in beds or in containers. As their name suggests they are snow white. They are cool to cold weather loving and therefore typically fruit during the cooler months.

GOLDEN OYSTER *Difficulty: Beginner*

Golden oysters can be grown on logs, in beds or in containers. This tropical oyster produces beautiful clusters with yellow caps which can be quite brittle when mature. They fruit naturally as temperatures warm up, preferring higher temps than blues.

LION'S MANE *Difficulty: Intermediate*

Lion's mane prefers the totem method but can be grown using any of the log methods. They produce a pure white cluster of icicle-like teeth. Lion's mane prefers to fruit during the cooler months.

CHESTNUT MUSHROOM *Difficulty: Intermediate*

Chestnut mushrooms can be grown in beds or by using the log inoculation method; trenching is advised after colonization. They have small brown caps resembling the color of their namesake nut. Chestnuts prefer to fruit during the cooler months. **Chestnuts have poisonous look alikes, be sure to properly identify them! Be familiar with the deadly *Galerina autumnalis*.**

NAMEKO *Difficulty: Advanced*

Nameko mushrooms can be grown in beds or by using the log inoculation method; trenching is advised after colonization. They are amber in color and known for their gelatinous cap. Namekos prefer to fruit during the cooler months.

REISHI *Difficulty: Advanced*

Reishi can be grown using any of the log methods; trenching is recommended if using the traditional log technique. **Ganoderma lucidum is a species that grows only on hardwoods. Ganoderma tsugae will not grow on hardwoods, we recommend hemlock wood.** Reishi has beautiful, waxy, reddish-brown shelf-like fruit bodies that are a highly prized immune-boosting medicinal. Reishi prefers to fruit during the warmer months.

HEN OF THE WOODS *Difficulty: Advanced*

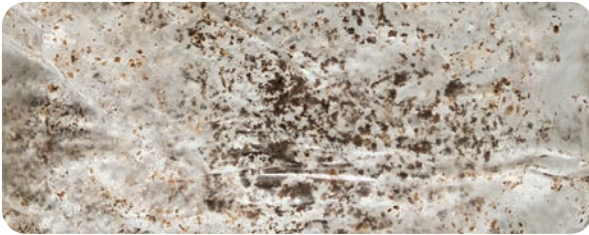
Hen of the woods is difficult to cultivate. We recommend treating logs prior to inoculation and burying or trenching after colonization. Hen of the woods resemble small leaf covered hens. They can fruit during the more mild of the summer months through the cooler months.

CHICKEN OF THE WOODS *Difficulty: Expert*

Chicken of the woods is very difficult to cultivate. We recommend treating logs prior to inoculation and burying after colonization. Chicken of the woods have large bright orange and sulphur yellow fruiting bodies. They fruit in shoulder seasons as temperatures are changing, though more often as they cool.

SPAWN STORAGE

- Plug and sawdust spawn will store for six months to a year in a refrigerator. The fresher the better, but mycelium is pretty resilient. If you don't get around to inoculating right away, tuck it away in your refrigerator until you're ready. *Note: Pink oyster and almond agaricus cannot be refrigerated. Almond agaricus will keep at room temperature for six months while pink oyster is best used within one month of receipt.*
- Only open your spawn bag when you are ready to use it. Opening it prematurely will increase the risk of it molding.
- It is not ideal to use spawn for more than one inoculation day.



Is My Mushroom Spawn Moldy? ▲

Mushroom spawn will naturally develop a white (or yellow for chicken of the woods), mold-like layer called mycelium. This branching network of threads is the primary body of fungi, the vegetative structure. A good analogy is if a mushroom is like an apple, then mycelium is like an apple tree. Seeing mycelium grow through your bag is normal and indicates healthy mushroom spawn. Break up your spawn bags thoroughly before use.

Often, mycelium is broken up in shipping, so it can appear less myceliated. Let it sit for a few days and it should bounce back.

EQUIPMENT

DRILL AND BIT

For sawdust spawn, we recommend a drill with a 12mm or 7/16" drill bit. If you are using a standard drill bit the bit can be marked with tape to ensure an accurate depth of 1" for either type of spawn.



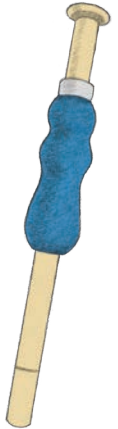
NORTH SPORE OFFERS A SPECIALIZED DRILL BIT FOR LOG INOCULATION WITH A STOPPER TO ACHIEVE THE CORRECT HOLE DEPTH.

INOCULATION TOOL

You can insert sawdust into the holes by hand but an inoculation tool greatly speeds up the process and allows the sawdust to be packed more densely increasing the success of log inoculations.

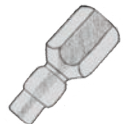
WAX

All of the holes need to be sealed with hot wax (chese wax, food grade paraffin wax, beeswax etc...) to prevent them from drying out and to seal them off from contamination. One pound of wax is enough to seal about 10 logs with some variability depending on the size of the logs and whether you choose to seal the ends. A wool dauber is a great tool for applying melted wax to your inoculated logs.



ANGLE GRINDER ADAPTER (OPTIONAL)

If you are inoculating several logs, you will find that an angle grinder adapter with an 12mm drill bit will help the work to go more quickly.



WHEN TO CUT YOUR LOGS

Healthy, living trees can be felled for mushroom logs nearly any time of year. It is not recommended to harvest logs during the spring between bud swell and full leaf out. During this time, most of the nutrients and energy of the tree are expended in a push to develop flowers and foliage, leaving little for fungal growth. Also, bark is loose, increasing the risk of damage during cutting. Intact bark is very important for the spawn run. Never cut dead, dying, or diseased trees for mushroom growing.

Timing log harvests with sap flow can help increase the yield and longevity of your mushroom logs. This typically coincides with dormancy cycles. Two ideal times for harvest are: during the fall, after $\frac{1}{3}$ of tree leaves have changed color through leaf drop and in late winter to early spring before bud swell and leaf out. These are both times when sugary sap in the tree will be concentrated in the wood, providing nutrients for mycelial growth, and bark should be tight reducing the risk of slippage.

For fall inoculation in grow zones 7 and higher, we recommend protecting logs from freezing temperatures and drying winds. Logs can be over-wintered in heated spaces, tucked away close to the walls of heated structures, or stored close to the ground and covered with leaves, blankets, and tarps.

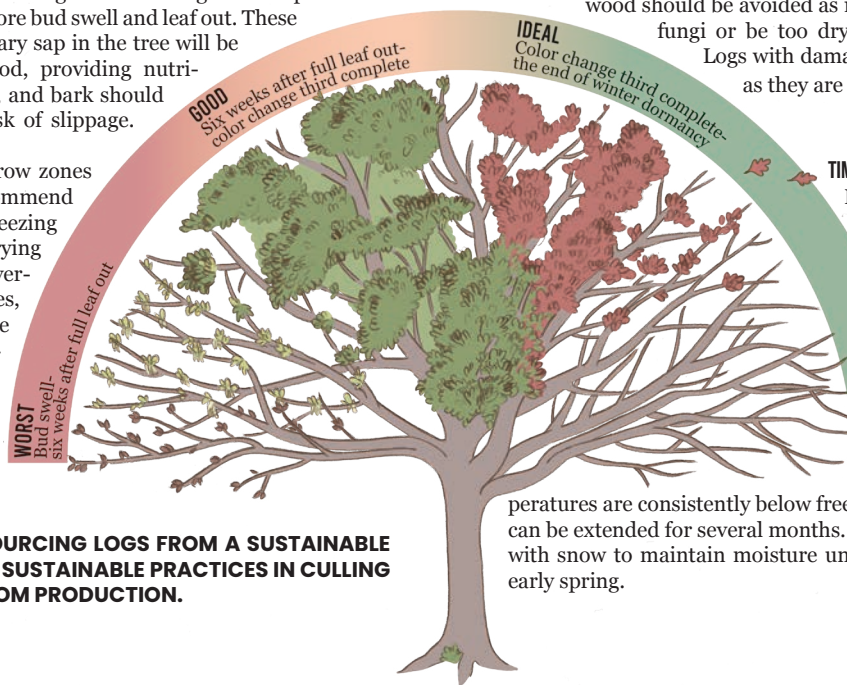
WE RECOMMEND SOURCING LOGS FROM A SUSTAINABLE FORESTER OR USING SUSTAINABLE PRACTICES IN CULLING TREES FOR MUSHROOM PRODUCTION.

LOG SIZE

Any size logs will work. You can use branches or saplings, if that is what you have available. Small-diameter wood will colonize faster, but will not produce for as many seasons as a larger log. You don't want the logs to be so large or heavy that they are difficult to use. For drilling methods, a 4-6" diameter with a 3-4' length is ideal. For the totem method, they can be up to a foot (or more!) in diameter, and 6-18" high.

OLD VERSUS FRESHLY CUT WOOD

Only freshly cut, disease-free wood should be used. Old or rotting wood should be avoided as it will likely contain contaminant fungi or be too dry to support mushroom growth. Logs with damaged bark should also be avoided as they are at risk of more easily drying out.



TIMING YOUR INOCULATION

Logs should be inoculated within a week or two of cutting. This allows the cells in the tree to die but is not long enough for the log to dry out or for other competitor fungi to become established. One month would be about the longest reasonable stretch of time between cutting and inoculating your logs. When temperatures are consistently below freezing, the window for inoculation can be extended for several months. Freshly cut wood can be covered with snow to maintain moisture until you are ready to inoculate in early spring.

LOG INOCULATION SPECIES COMPATIBILITY CHART

	Allanthur	Alder	Ash	Aspens	Basswood	Beech	Birch	Black Walnut	Box Elder	Buckeye	Cherry	Chestnut	Chinese Tallow	Cottonwood	Elm	Eucalyptus	Hackberry	Hemlock	Hickory	Hophornbeam	Hornbeam	Maple, Hard	Maple, Soft	Mimosa	Mulberry	Oaks	Palm	Peach	Pear	Pecan	Pines	Sassafras	Sweetgum	Sycamore	Tuliptree	Tupelo	Willow	
Shiitake	★	×	×	✓	★	✓	×			×	✓		×	×	✓	×	✓	★	★	★	✓				★	×	×	✓	×	✓	★	✓	✓	✓	✓	✓	✓	
Oyster	✓	✓	×	★	✓	✓	✓		✓	✓			✓	★	✓		✓	×		✓		✓	✓			✓	×	✓				✓	✓	✓	★		★	
Italian Oyster	✓	✓	×	★	✓	✓	✓		✓	✓			✓	★	✓		✓	✓		✓		✓	✓			✓	×	✓			✓	✓	✓	✓	★		★	
Lion's Mane	✓			✓		★	✓	✓		✓	✓		✓	✓		✓	×			★	★	✓				✓					×		✓					
Chestnut	✓	✓	★	✓	★	★			✓	✓				★	✓		✓	×		★	✓	★				✓	★							★				✓
Nameko	✓	✓	★	✓	★	✓			★	★	★			★	✓	✓	✓	×		★	★	★	✓			✓	★					✓		★				✓
Chicken of the Woods	×	×		×	×		×	×	×	×			×	×	×	×	×					×	×	×	★	×					×	×	×	×	×	×	×	×
Hen of the Woods	×	×	×	×	×		×	×	×	×			×	×	×	×	×					×	×	×	★	×					×	×	×	×	×	×	×	×
Reishi (Ganoderma lucidum)	✓					✓								✓			×				★	✓	✓	✓	✓	✓	✓			×		★	✓				✓	
Reishi (Ganoderma tsugae)	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	★	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×

KEY

- ★ BEST
- ✓ SUITABLE
- × NOT RECOMMENDED

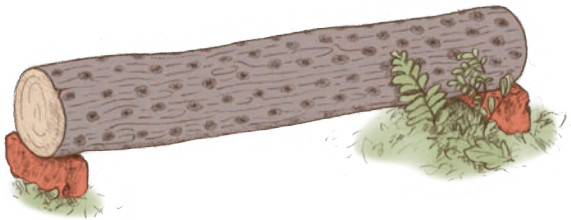
- BLANKS REPRESENT UNKNOWN OR UNTESTED
- FOR MOST MUSHROOMS, CONIFERS OR SOFTWOODS SHOULD BE AVOIDED

TRADITIONAL LOG METHOD

For drilling methods, a 4-6" diameter with a 3-4' length is ideal. Larger logs can be used but you don't want the logs to be so heavy that they are difficult to move.

1. Use a 12mm or 7/16" bit and drill to a depth of 1" in a diamond pattern all over the perimeter of the log, omitting the cut ends. We recommend spacing holes four inches apart in rows that are staggered two inches apart.
2. Use an inoculation tool to push sawdust spawn into the holes.
3. Brush melted wax over each plugged hole. We use a crockpot to melt the wax and a wool dauber or paint brush to apply it. The double boiler method can also be used. Sealing the holes is critical to success because it protects the spawn from drying out and from contamination. Keep in mind that it can be difficult to clean away the wax so allocating a thrift store crockpot or bowl to the job is a good idea.

For initial log colonization, wood can be stacked like firewood in a shady area of forest. At this stage stacks should be kept low to the ground where it's more humid, yet out of direct contact with the forest floor. A pallet or pieces of scrap wood work well for this. After the colonization period is finished, restack the logs in a log cabin fashion for easy harvesting and airflow. Place in a shady part of your garden or in the woods.

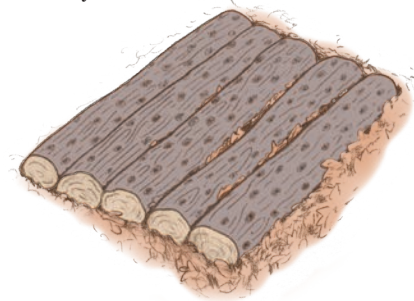


TRENCHING OR BURYING YOUR LOGS

Burying or partially burying logs has been found to be critical to the successful fruiting of a few specific species. The advantages of burying or trenching these logs include additional moisture around the logs, beneficial microbes in the soil and triggers for fruit body development including light and oxygen limited to a smaller surface area.

WE RECOMMEND BURYING OR TRENCHING HEN OF THE WOODS, CHICKEN OF THE WOODS, CHESTNUT, NAMEKO AND REISHI LOGS AFTER FULL COLONIZATION. One way to check if your log is colonized is by looking for mycelium on the ends of your logs. Mycelium does not always cover the entire end but should be visible on most of the end, either on the surface or under the wax. If no mycelium is visible you can use the average colonization time of the species you selected. If in doubt we recommend waiting approximately one year in areas with snowy winters while those in areas with mild winters could trench their logs after three seasons have passed. Keep in mind larger diameter logs will take longer to colonize.

In order to trench your logs dig out an area half as deep as the diameter of your logs in a shaded location. Reserve the soil you remove from this area. Place your logs in your dug trench in a raft formation. Then take your reserved soil and pack it around and between the logs so only the top surface area of the logs are exposed. For chestnut and nameko, wood chips or sawdust can be used in addition to or in place of soil. Water the area so the material around your logs compacts and add more if necessary!





Fully colonized logs can be leaned against a support or stacked in the log cabin arrangement above for aeration and easy harvesting.

Any size stumps can be inoculated, but they should be from freshly cut trees. All inoculated stumps should be located in a shady environment. Make sure you can identify the stump and you know what species of tree it is!

1. Girdle your stump by removing a two inch wide band of bark, make sure to remove both the outer and inner layers of the bark. This helps to prevent suckers from growing.
2. Use a 12mm or 7/16" bit and drill to a depth of 1" all over the top, sides, and exposed roots of the stump.
3. Use an inoculation tool to push sawdust spawn into the holes.
4. Brush melted wax over each plugged hole. We use a crockpot to melt the wax and a wool dauber or paint brush to apply it. The double boiler method can also be used. Sealing the holes is critical to success because it protects the spawn from drying out and from contamination. Keep in mind that it can be difficult to clean away the wax so allocating a thrift store crockpot or bowl to the job is a good idea.

STUMPS TAKE LONGER THAN LOGS TO COLONIZE BUT CAN PRODUCE FOR UP TO A DECADE.



TOTEM METHOD

Totems are specifically good for oyster mushrooms, lion's mane, and reishi. Smaller segments of logs are stacked upright with sawdust spawn sandwiched between the sections. Large-diameter wood becomes easy to use and attractive to display.

1. Cut three sections of log for each totem: one piece only 2" long, and two sections 6" to 18" long.
2. Bring your supplies to your shady incubation place and create the totems on site.
3. Lay a piece of brown cardboard or a kraft paper bag on the ground, sprinkle on a layer of sawdust spawn about 1" deep, and stand one of the 6"-18" pieces upright on top of the spawn. Add another layer of sawdust spawn on top of this section and stand the next 6"-18" section on top. Add one last layer of sawdust spawn on this section and then cap the totem with the remaining 2" piece. Place an overturned paper lawn and leaf bag over your totem. Tuck it under at the bottom or add weight to keep in place. The bag will help keep in moisture and keep out contaminants and pests.
4. Incubate the covered totems for 4-12 months. When the logs are covered with a visible layer of mushroom mycelium (white mold-like substance) the paper bag can be removed. The totem can be left intact or broken up into individual sections for fruiting.

TOTEMS ARE SPECIFICALLY GOOD FOR OYSTER MUSHROOMS, LION'S MANE AND REISHI.



CHICKEN AND HEN OF THE WOODS

Chicken of the woods as well as hen of the woods are prone to being out-competed by other fungi which make them unreliable producers. To increase your chances of success we strongly suggest first heat treating your logs to provide a blank slate for your desired species.

1. Place a one foot log segment of approximately 8" in diameter in a filter patch bag. Place upright into your hot water bath, weigh down if necessary. You can also seal the top by wrapping around a piece of wire and twisting to tighten. This can be helpful in ensuring water does not enter your bag. Maintain a low boil for one hour. Let your log cool completely.
2. Add one generous cup of sawdust spawn into your filter patch bag. One bag of sawdust spawn should reliably inoculate 8-12 segments.
3. Seal the top of your filter patch bag. This can be achieved by sandwiching the top of your bag between layers of parchment paper or aluminum foil and ironing on a low setting. Let cool before peeling away parchment or foil, double fold and repeat for a more reliable seal. Alternatively the top can be closed with a piece of wire as outlined in step one or sealed with non porous tape such as packing tape.
4. Work the sawdust spawn within the sealed bag so that the majority of it is located on the top and bottom of your log segment in contact with the cut ends.

5. Allow to colonize for at least two months until mycelium is present on much of the log segment. Remove from the bag and bury in a shaded spot vertically under 1-2" of soil. Mark your location and begin to check the site after one year when fruiting conditions are favorable.

Log segments can also be heat treated using a steam sterilizer or a 22 qt or larger pressure cooker. Be sure to read the manual and familiarize yourself with the safe operation of your pressure cooker.



POST INOCULATION

HOW LONG WILL IT TAKE FROM THE TIME OF LOG INOCULATION TO HARVEST?

That will depend on what species you're growing, the size of your logs, and environmental conditions. Most mushrooms on standard size logs in temperate climates will take about a year to fully colonize before they fruit. This can vary between 6 months to two years. Smaller diameter logs and soft hardwoods will typically fruit sooner, though they'll have less longevity.

Often, mushrooms need cool weather and moisture to fruit. Growth slows in the heat of the summer. If you inoculate in the spring, you might get your first flush of mushrooms in the fall but most likely it will take a full year until you see your first fruiting. If you inoculate in the fall and are able to keep the mycelium from going dormant, you may get mushrooms as soon as the next spring, though more likely the following fall.

WHAT KIND OF YIELD CAN I EXPECT?

The general rule of thumb is one year of production per inch of log diameter. However, yields will vary greatly depending on the strain of mushroom, tree species used, whether or not it's forced and environmental conditions each season.

HOW OFTEN SHOULD I WATER MY LOG?

It's important not to let the log dry out but it's also important not to over-water the log. Logs should be stored in shady outdoor locations close to the ground. In temperate climates, they generally retain enough moisture to colonize fully without watering. During especially dry years, droughts, and in arid climates, watering may be necessary. Most of the time though, no supplemental watering is needed.

Logs shouldn't stay wet on the outside for long periods of time. Frequent light watering can even damage logs and cause contaminant growth. Long periodic soaking of no more than 24 hours is the preferred method of renewing water content should your logs appear dry or lose vitality.

NEVER EAT A MUSHROOM YOU HAVE CULTIVATED WITHOUT BEING ABSOLUTELY SURE YOU HAVE CORRECTLY IDENTIFIED IT.

CAN I ALLOW MY LOG TO FREEZE OVER WINTER?

Logs will be fine outdoors in the winter as mycelium goes dormant and does not die. A blanket of snow will help to protect the logs from drying out.

CAN I SOAK MY LOGS TO FORCE THEM TO PRODUCE MUSHROOMS?

Force fruiting works best with shiitake mushrooms. We recommend soaking your logs overnight and not more than 24 hours. You should allow your log to fruit once naturally (after a rainfall or other triggering event) before attempting to force fruit your log. Allow at least one month of rest before attempting to force fruit again.



Mycelium visible on the ends of colonizing logs.

CULINARY USE

BLUE OYSTER Pleasant aroma and perhaps the most delicious and unique tasting oyster. Stems are less tender than other oysters. Very meaty and can replace button mushrooms in most recipes. *All oysters can develop a viscous texture if undercooked. We recommend cooking until their liquid has cooked off and they begin to brown.*

ITALIAN OYSTER Aroma can be likened to anise or licorice. Very versatile and considered one of the finest culinary oyster mushrooms.

SNOW OYSTER Sweet and pleasant aroma. Similar to the Italian oyster in texture but with a smaller stem.

GOLDEN OYSTER Sweet and fruity aroma, sometimes like melon. When cooked they are meaty and a bit nutty.

SHIITAKE Meaty texture when cooked. Good for drying and reconstituting in winter soups.

LION'S MANE Flavor and consistency similar to crab. Can be used as a substitute for crab and lobster in recipes.

CHESTNUT Full flavor that is evoked with thorough cooking. We recommend you use its rich, nutty flavor as a compliment to autumn soups.

NAMEKO Aroma that walks the line of being both fruity and earthy. Gelatinous cap that can thicken soups and sauces. A standard ingredient in Miso soup.

CHICKEN OF THE WOODS Lemony meaty taste with a texture similar to chicken. Great in soups and stir-fries.

HEN OF THE WOODS Semi-firm texture and earthy flavor. It can be ripped into small pieces and added to a dish or left large as the centerpiece of a meal.

REISHI Not for culinary use but recommended for teas and tinctures. To make a tea, break reishi into pieces and simmer in water for two hours. Has a bitter, earthy flavor.



SPORE REWARDS

We want to give back to you, as a thank you for choosing to take your mushroom journey with us. So we set up our Spore Rewards program! As a member you'll be able to save on all of your regular purchases, get special perks, and you can help us bring more folks into the mycological fold.

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NORTHSPORE